



## **Aging, task difficulty, and effort: a meta-analysis**

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**Abstract:** Tasks of increasing difficulty require increasing levels of cognitive engagement from participants. The costs associated with cognitive engagement rise with age in response to normative cognitive decline. Additionally, previous studies have shown an interaction between age and task difficulty, with age differences in effort expenditure increasing along with task demands. Motivational accounts of effort allocation predict the opposite relationship, where increased task difficulty in the face of declining cognitive abilities result in disengagement among older adults, comparatively lowering their effort expenditure relative to younger adults that remain committed to the task. The current study quantitatively reviews the available literature on age and effort expenditure across tasks of increasing difficulty. An initial meta-analysis found no age differences in effort across task difficulty, but inspection of the significantly heterogeneous effect sizes indicated that measurement domain might account for some of the variance found between the effect sizes. A second, post-hoc meta-analysis was conducted, recoding effect sizes giving preference to subjective measures. Subsequent moderator variable analyses found that the combined effect of age and domain of effort measurement explained a sufficient portion of the variance across effect sizes. When using physiological measures, effort was not found to differ across task difficulty for either age group. Alternatively, when measured subjectively, effort was reported to greatly increase (gt;1 standard deviation) with difficulty, with a larger increase in younger adults. Results are discussed in terms of effort mobilization across adulthood and the importance of measurement domain in the interpretation of results.

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the flexibility of the SLUMS exam did not achieve the level of success as anticipated. Although this pilot work had low power, when coupled with our past work on developing adaptation guidelines, sheds critical light on the layered complexity that arises at the intersections of education, culture, race, gender, socioeconomic status, and intercultural interactions and the resulting potential directions for future work will be discussed.

#### MEASUREMENT EQUIVALENCE OF THE POSITIVE AND NEGATIVE AFFECT SCHEDULE BETWEEN YOUNG-MIDDLE-AGED AND OLDER ADULTS

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A Short form of the Positive and Negative Affect Schedule (PANAS-SF) has been widely used to measure of affect in diverse cultural groups. Limited studies have been evaluated the measurement equivalence test of PANAS-SF in diverse age groups. This study examined whether parameters in the measurement model (two-factor model: positive and negative affect) is equivalent across the two age generations (young-middle aged: <65 years [n=1,122]; older adults : ≥65 years [n=1,817]). The sample was obtained from the 2012 Health and Retirement Study and Multiple Group Analysis was performed. The five items of determined, enthusiastic, inspired, alert, and excited reflected positive affect; and the five items of afraid, upset, scared, nervous, and distressed reflected negative affect. The configural model reported acceptable fit ( $\chi^2 = 904.98$  [df = 64,  $p < .001$ ],  $X^2/df = 14.14$ , CFI = .93, GFI = .94, RMSEA = .06 [90% CI = .06 - .07]). When all factor loadings were constrained, it indicated measurement non-invariance status between young-middle aged and older adults ( $\Delta\chi^2 = 56.03$ ,  $\Delta df = 8$ ,  $p < .001$ , CFI = .93,  $\Delta CFI = .004$ ). Given findings of non-invariance on the full constrained model, the invariance test of each factor loading was performed additionally. Majority of negative items (Afraid, upset, scared, and nervous) and several positive items (determined and excited) were nonequivalent between the two groups. Variances in the measure between two age groups raise a number of issues for future research on affect assessment, suggesting cautious using of PANAS-SF in older adults.

#### AGING, TASK DIFFICULTY, AND EFFORT: A META-ANALYSIS

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Tasks of increasing difficulty require increasing levels of cognitive engagement from participants. The costs associated with cognitive engagement rise with age in response to normative cognitive decline. Additionally, previous studies have shown an interaction between age and task difficulty, with age differences in effort expenditure increasing along with task demands. Motivational accounts of effort allocation predict the opposite relationship, where increased task difficulty in the face of declining cognitive abilities result in disengagement among older adults, comparatively lowering their effort expenditure relative to younger adults that remain committed to the task. The current

study quantitatively reviews the available literature on age and effort expenditure across tasks of increasing difficulty. An initial meta-analysis found no age differences in effort across task difficulty, but inspection of the significantly heterogeneous effect sizes indicated that measurement domain might account for some of the variance found between the effect sizes. A second, post-hoc meta-analysis was conducted, recoding effect sizes giving preference to subjective measures. Subsequent moderator variable analyses found that the combined effect of age and domain of effort measurement explained a sufficient portion of the variance across effect sizes. When using physiological measures, effort was not found to differ across task difficulty for either age group. Alternatively, when measured subjectively, effort was reported to greatly increase (>1 standard deviation) with difficulty, with a larger increase in younger adults. Results are discussed in terms of effort mobilization across adulthood and the importance of measurement domain in the interpretation of results.

#### REACTIVITY TO THE MEASUREMENT OF PSYCHOLOGICAL WELL-BEING IN OLDER ADULTS

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Although it is known that measurement reactivity can yield medium-sized effects (Cohen's  $d = .50$ ) on anxiety, its effects on psychological well-being (PWB) measures (e.g., purpose in life, personal growth) are unknown. The aim of this study was to evaluate reactivity to the measurement of PWB in older adults. Ninety-four adults aged 60 ≥ years (mean = 75) were recruited from a fitness center, retirement home and community center in Indiana. All participants received a questionnaire via postal mail at baseline (T1) and 2-3 weeks later (T2). Using block randomization (block size = 16), older adults were randomly allocated (1:1 ratio) to one of two conditions: PWB measures assessed at T1 and T2; and PWB measures were at T2 only. Purpose in life and personal growth were assessed using Ryff's PWB scales. Multiple imputation analysis was conducted to account for attrition at T2 (18%), and all participants were analyzed according to the condition they were originally assigned. ANCOVA, controlling for recruitment sites, revealed that purpose in life ( $p = .03$ ), but not personal growth ( $p = .08$ ), T2 scores were on average lower when PWB was measured twice compared to those when PWB was measured once. The detected difference in purpose in life T2 scores was of medium size ( $d$  [95%CI] =  $-.50$  [ $-.95, -.04$ ]). This finding suggests that initial or later scores might be biased – a problematic finding because if ignored, measurement reactivity has the potential to affect conclusions drawn from gerontological research that focuses on PWB.

#### DEVELOPMENT AND VALIDATION OF THE TESTAMENTARY CAPACITY MEASURE AMONG OLDER ADULTS AND PATIENTS WITH DEMENTIA

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